

# Data Acquisition Controllers and Computers that can Endure, Operate and Survive Cryogenic Temperatures, Phase I

Completed Technology Project (2011 - 2011)



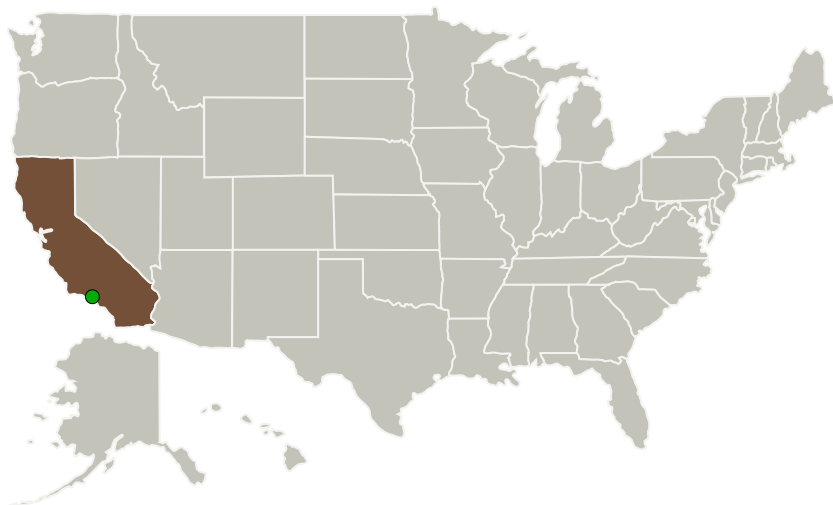
## Project Introduction

Current and future NASA exploration flight missions require Avionics systems, Computers, Controllers and Data processing units that are capable of enduring extreme low temperature environments of Deep space, Lunar and Martian surfaces. With recent technological advances in Field Programmable Gate Arrays (FPGA), it has become possible and feasible to architect complete System on a Chip (SoC) using a single FPGA. Large FPGAs have increased number of gates per square inch with reduced power consumption per gate and include  $\mu$ Processors with soft and hard IPs, Arithmetic modules, sizeable onboard memory and A/D included. Our proposal in particular responds to the technologies sought that enable NASA's long duration missions to low temperature and wide temperature environments. This Development is required under the technology prioritization list for Extreme Environment Technology. As outlined in this proposal we will explore innovative approaches and introduce new technologies that will enable engineers to build high-reliability and high-performance, cold capable Space and Avionics data acquisition and computers systems that are able to operate and perform in extreme cold temperature range beyond the standard military specification of -55

o

C, surviving cryogenic temperatures over mission life. Proposed innovative architecture will use an existing Radiation Tolerant/Hardened FPGA technology.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
B&A Engineering Systems Inc.	Lead Organization	Industry	San Dimas, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California

## Project Transitions

▶ **February 2011:** Project Start

✓ **September 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138073>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

B&amp;A Engineering Systems Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

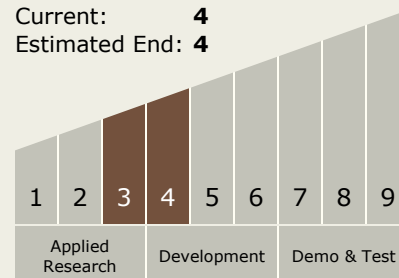
Alireza Bakhshi

## Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.1 Avionics Component Technologies
    - └ TX02.1.5 High Performance Field Programmable Gate Arrays

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System